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Level 6 THERMO

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c)

$$\dot{m}_c = ?$$

$$\dot{Q} = \dot{m}_c c_p (T_o - T_i)$$

$$\dot{m} = \frac{\dot{Q}}{c_p (T_o - T_i)}$$

$$\frac{120000}{4180 \times (85 - 22)} = 0.456 \text{ kg/s}$$

d) A = ?

$$Q = U A F \Delta T_{lm}$$

$$A = \frac{Q}{U F \Delta T_{lm}}$$

$$\Delta T_{lm} = \frac{\Delta T_o - \Delta T_i}{\ln\left(\frac{\Delta T_o}{\Delta T_i}\right)}$$

$$\Delta T_i = T_{Hi} - T_{Co} = 140 - 85 = 105$$

$$\Delta T_o = T_{Ho} - T_{Ci} = 150 - 22 = 128$$

$$\frac{128 - 105}{\ln\left(\frac{128}{105}\right)} = 116.12$$

$$A = \frac{120000}{400 \times 0.43 \times 116.12} = 2.778 \text{ m}^2$$

$$e) \dot{Q} = 1.0625 \times 2400 \times (150 - 190) = -102000 \text{ W}$$

$$A = \frac{102000}{400 \times 0.93 \times 116.12} = 2.361 \text{ m}^2$$